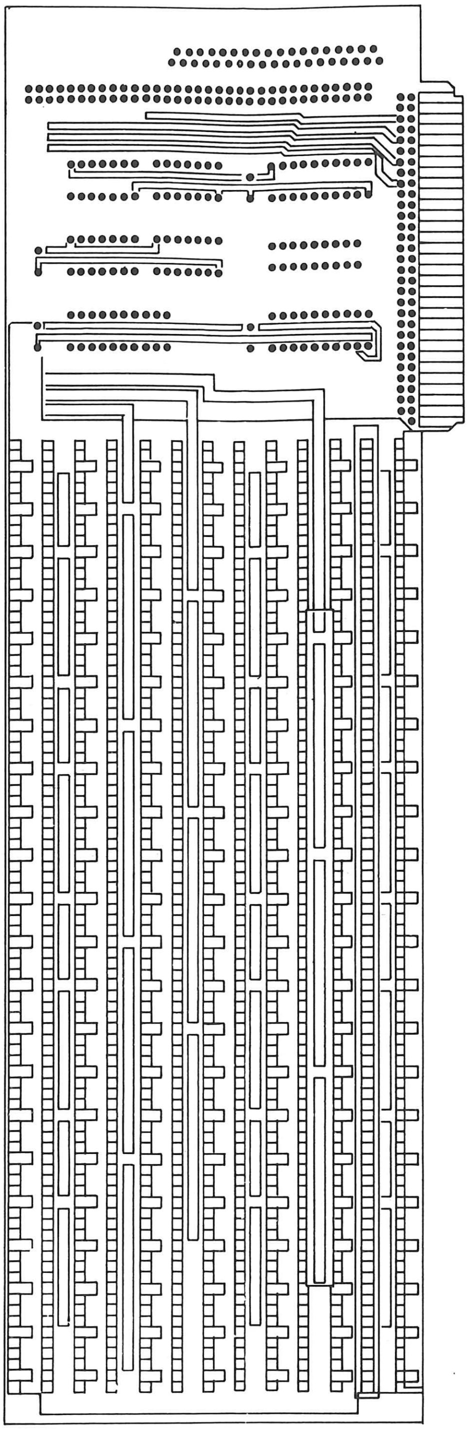
PROTOTYPING BOARDS FOR THE IBM PC., AT OR XT COMPUTERS



VERO
BICC ELECTRONICS

IBM PROTOTYPING

INTRODUCTION

The IBM range of personal computers provide edge connector sockets on the mother board to cater for expansion of the system. These expansion capabilities provide for memory addition, printer interfaces, graphics options, data acquisition, communication modules etc.

BICC-Vero IBM PC prototyping boards are designed to fit into one of the expansion sockets on the motherboard, and if required, providing on board track layout for signal buffering and decoding, together with a grid matrix area designed to facilitate the development and construction of electronic circuits. In addition, ground and power distribution buses are available throughout the board area and a position is available for fitting an additional I/O connector of miniature "D" type with up to 37 ways.

IMPORTANT

The prototyping board provides a convenient means of interfacing external circuitry with the IBM computer. Its proper use requires further information on the IBM system which is available from relevant IBM publications.

IBM PC and PC XT Computers

Five types of prototyping board are available :-

1. Microboard pattern (part number 222–42697G) being a PTH circuit board with solder pads to allow for soldering or for wire wrapping (when wirewrap pins or sockets are inserted), and having on board track layout for interface circuitry.
2. Microboard pattern (part number 222–42936H) being a PTH circuit board with solder pads to allow for soldering or for wire wrapping (when wirewrap pins or sockets are inserted).
3. Speedwire pattern (part number 244–42768K) being a PTH circuit board with Speedwire IDC terminals or mounting and interconnecting components (using the Speedwire pen, part number 244–26213E), having on board track layout for interface circuitry.
4. Speedwire pattern (part number 244–42937D) being a PTH circuit board with speedwire IDC terminals for mounting and interconnecting components (using the Speedwire pen 244–26213E)
5. Speedwire pattern (part number 244–52877J) being a half length PTH circuit board with Speedwire IDC terminals for mounting and interconnecting components using the Speedwire pen (part number 244–26213E).

The following description applies equally to the Microboard and the Speedwire development system. Only items 1 and 3 above have on board interface circuitry and the description of the interface layout applies only to these two items. The boards without interface circuitry have solder pads (Speedwire terminals) for correction directly to the edge connector contacts, with power rails available for power distribution.

DESCRIPTION

The IBM prototyping board measures 97mm high by 333mm long with a 2 x 31 way 2,54mm pitch double sided, gold plated edge connector. It is designed to plug into one of the expansion slots in the mother board of the computer.

Signals and power lines are made available on the edge connector as shown:

Note that data and address lines are primarily on the Component (A) side of the edge connector.

For more information on the signal lines please refer to the relevant IBM manual.

To simplify the interfacing of the prototype board circuitry to the computer system on board circuitry is provided to buffer and decode relevant signals.

The following buffered and decoded signals are available on the prototyping board:

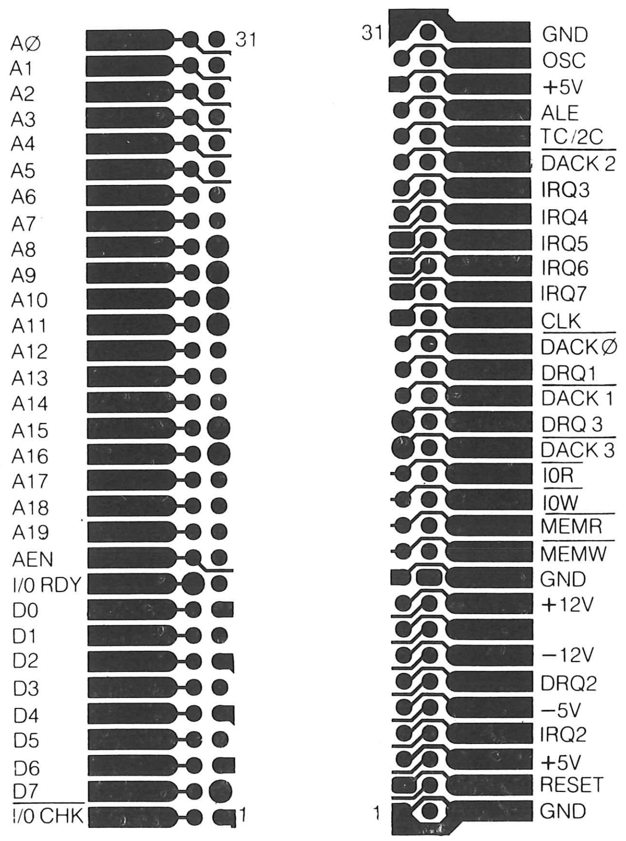
8 data bus lines labelled E1,3,4,6-10
1 address decode line labelled E11
5 address lines labelled E2,E5,E12-14
1 memory read line labelled E15
1 memory write line labelled E17

The six low address lines are used together to address on board devices in range &300 to &31F

(Note: an additional buffer is available if required, input on E18 and output on E16)

Power rails of +12V, +5V, OV –5V and –12V are available as indicated on the board.

(On the Microboard version power distribution strips labelled A to E may be tied to power rails as required).



Component side

Wiring side

INTERFACING AND ADDRESSING

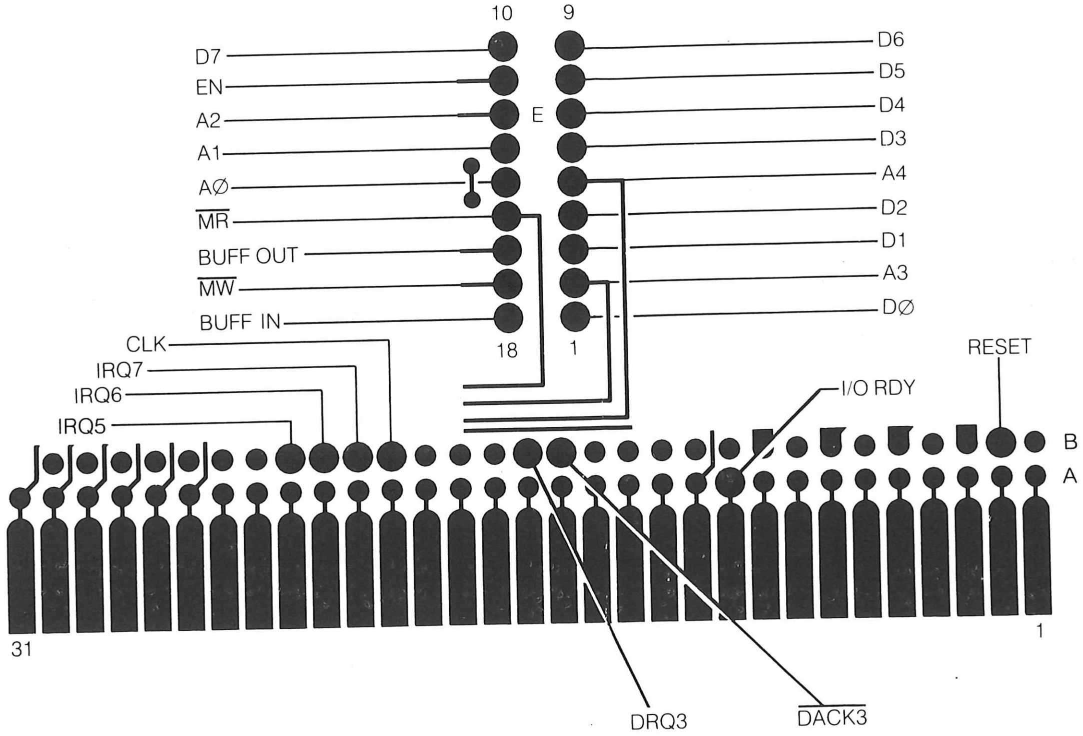
The on board circuitry is designed to buffer the input/output lines and provide address coding as recommended by IBM.

IBM have allocated addresses in the range &300 to &31F to prototyping board devices and the prototyping board decodes the high address lines to give the EN signal on E11 leaving the low A0-A4 lines available for additional decoding in the range &300 to &31F.

Other addresses could be decoded by suitably gating the address lines.

Similarly, the on board circuitry make available those signal lines which would be commonly required. Other signal lines may be accessed if required from the edge connector. In particular, solder pads (Speedwire Terminals) have been provided to access other signal lines as shown below:-

Component side



USING THE PROTOTYPE BOARD

If the on board buffering/decoding facility is to be used the following parts are required.

U1 74LS245
U2 74LS244
U3 74LS08
U4 74LS04
U5 74LS244
U6 74LS02
U7 74LS21
C10 μF tantalum
C2,3,4, 0.047μF ceramic

These items should be inserted into the relevant labelled positions on the component side of the board. The Speedwire board provides sockets for insertion while the microboard version has solder pads.

All boards provide a grid matrix of component mounting positions where a circuit may be constructed. Dedicated ground rails labelled OV are provided together with uncommitted distribution strips A to E which may be connected to voltage rails or other lines as required. In addition, decoded and buffered signals are available from pins E1-E18 as previously described with additional signal lines accessible if required.

The microboard is designed such that most circuits can be constructed without cutting tracks. Should tracks need to be cut remember this is a board with plated through hole and tracks will need to be cut on both sides.

If required mounting holes are provided for an additional "D" type connector with up to 37 ways, although not all the output terminals need be used.

FITTING THE PROTOTYPE BOARD

Before fitting the board in the computer it should be checked out for obvious faults, in particular power connections should be checked for short circuits etc. BICC-Vero can in no circumstances accept responsibility for any damage which may result in installing a faulty assembly into the computer.

Switch off power to the computer
Remove all rear panel connectors and cable
Remove the two cover mounting screws at the bottom left and right of the rear panel
Slide the cover away from the rear. When it will slide no further tilt the cover up from the front and remove from the base
The expansion slots are situated at the left rear of the computer

Note that IBM recommend the use of slot no. 3 if it is not already in use.

If an additional input/output "D" type connector is fitted to the expansion board then remove the appropriate expansion slot cover by removing its top retaining screw and sliding out the cover.

Fit the expansion board into the appropriate edge connector

Replace the unit cover by reversing the removal procedure

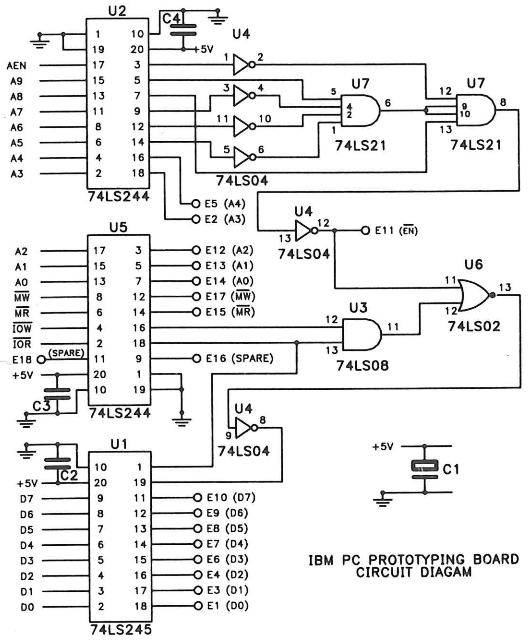
Reconnect rear cables and connectors to complete the installation process and fit screws

At no stage use undue force

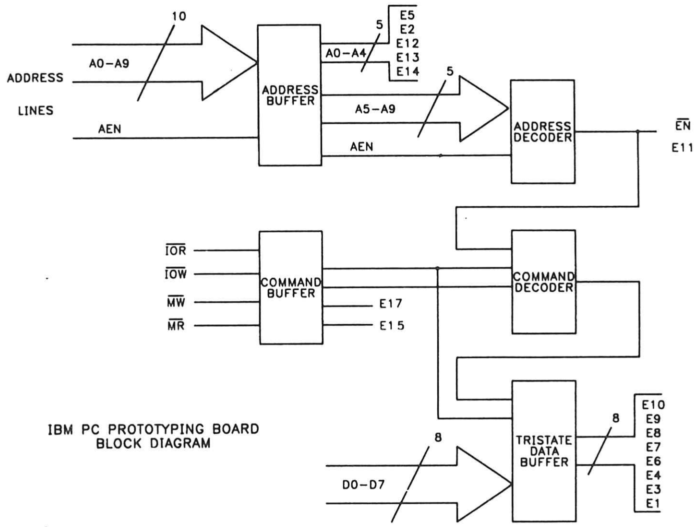
If the fitting procedure seems to be difficult, then check your installation

More details are given in the relevant manufacturers manual

Circuit diagram



Block diagram



For further information on boards for the IBM AT and equivalents please see overleaf.

ADDITIONAL INFORMATION FOR IBM AT USERS

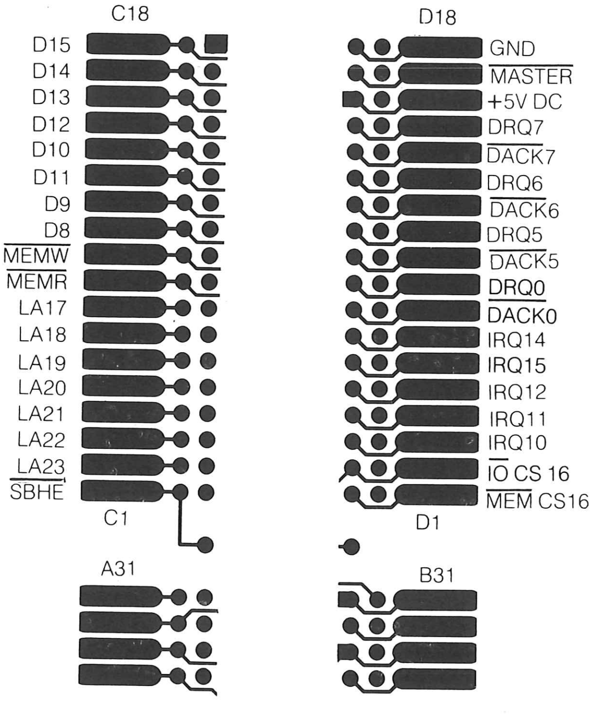
The following notes should be read in conjunction with the information on the IBM PC and PC XT given previously.

The following details apply to BICC-VERO boards for the IBM AT computer and compatible systems.
The information on additional bus features and recommended interface applies to the whole range of AT products whilst the interface layout information applies only to boards 222–53100K and 244–53101F, both of which have have interface track layout.

ADDITIONAL BUS DESCRIPTION

The IBM AT supports the 2 x 31 way 2,54mm pitch bus already described and in addition provides a 2 x 18 way 2,54mm pitch bus with the functions shown below. The additional bus provides extra data and address lines as well as IRQ and DACK lines. The BICC-VERO range of IBM AT compatible boards have an extra edge connector to allow the additional features to be accessed.
Please note that PC compatible boards can be used in an AT system but do not access the additional AT features.

ADDITIONAL AT BUS DETAILS



Component side **Wiring side**

For further details please refer to the relevant manufacturers literature.

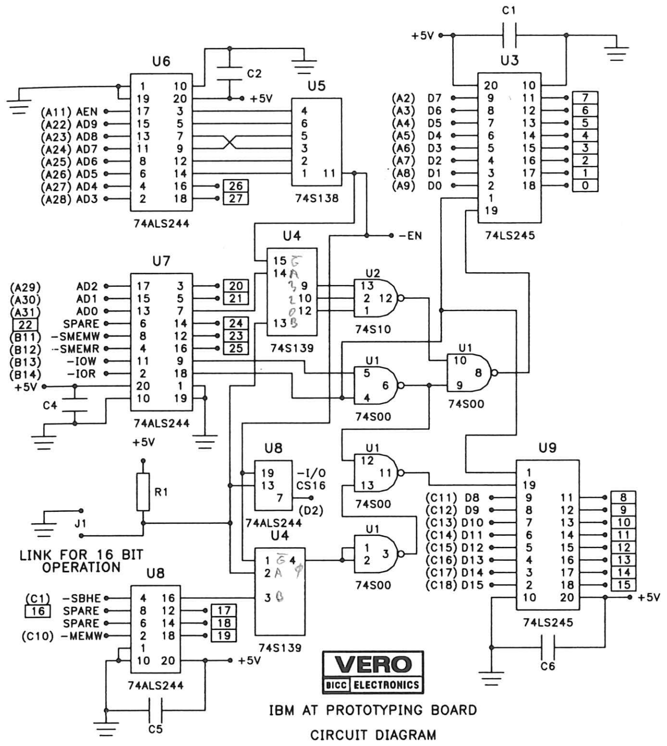
The following parts are required to construct the recommended interface circuit for the IBM PC AT Prototype Board.

U1	74S00		
U2	74S10	U7	74ALS244
U3	74LS245	U8	74ALS244
U4	74S139	U9	74LS245
U5	74S138	C1	10μF Tantalum
U6	74ALS244	C2,3,4,5,6,7,8	0.047 μF Ceramic

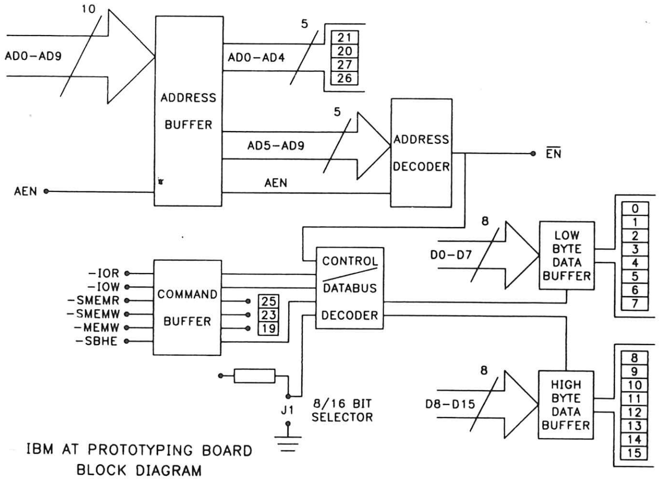
AT INTERFACE CIRCUITRY

The recommended interface circuitry for the IBM PC AT is shown below. In addition to buffering and decoding data and address lines the interface provides decoding for the high and low bytes of the 16 bit data signal. Selection of 8 or 16 bit operation is made by means of a jumper link on the prototype board.

Circuit diagram

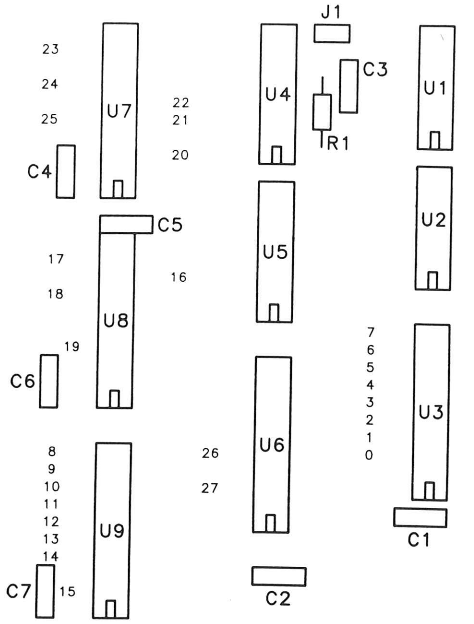


Block diagram



AT INTERFACE CIRCUITRY

Pin number	Function	Pin number	Function
0	D0	14	D14
1	D1	15	D15
2	D2	16	SPARE INPUT
3	D3	17	SPARE OUTPUT
4	D4	18	SPARE OUTPUT
5	D5	19	— MEMW
6	D6	20	AD2
7	D7	21	AD1
8	D8	22	SPARE INPUT
9	D9	23	— SMEMW
10	D10	24	SPARE OUTPUT
11	D11	25	— SMEMR
12	D12	26	AD 4
13	D13	27	AD 3



BICC-VERO IBM Prototyping boards

Ordering information

Description	Board size			Order code
	length	x	width	
IBM PC, XT Microboard				
Board with interface circuitry	333	x	97	**222–42697G**
Board without interface circuitry	333	x	97	**222–42936H**
IBM PC, PC XT Speedwire Boards				
Board with interface circuitry	333	x	97	**244–42768K**
Board without interface circuitry	333	x	97	**244–42937D**
Short board without interface circuitry	216	x	97	**244–52876L**
IBM AT Microboards				
Board with interface circuitry	333	x	114	**222–53100K**
Board without interface circuitry	333	x	114	**222–52877J**
IBM AT Speedwire Boards				
Board with interface circuitry	333	x	114	**244–53101F**
Board without interface circuitry	333	x	114	**244–52878E**
Board with PGA area (without interface circuitry)	333	x	114	**244–52879B**
IBM Bus				
IBM Bus Extender Card (suitable for PC,PC XT and PC AT)				**109–53107L**

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